Data Structure and Algorithms

Lab2

TOPICS:

Data Structure

Linked List

Singly Linked List

Doubly Linked List

GitHub Repo Link for lab2:

https://github.com/SomSingh23/DSA__Lab2

Click Here

Exercise 3.a

create a input txt file

initialize input output file stream

to read and write data

create class node

with marks, name and id as data and

also, a *next node pointer

take input in an array of int, int and string

perform a bubble sort to sort them acc to marks and if marks are equal then by id

then create a function name create to create linked list of these element

also create a display function which

will output data into a .txt file

Time complexity:

O(n^2)

Due to bubble sort

Input:

```
     You, 7 hours ago | 1 author (You)
 1   5          You, 7 hours ago • initial commit …
 2   1
 3   som
 4   5
 5   2
 6   sourish
 7   100
 8   4
 9   srushti
10   0
11   5
12   srijan
13   100
14   3
15   soham
16   99
```

Output:

Pic_1

PROBLEMS ② OUTPUT DEBUG CONSOLE TERMINAL GITLENS

```
PS C:\Users\somsi\dsa_lab_work_iiit-P\lab_2\3a> .\3a
File is opened
PS C:\Users\somsi\dsa_lab_work_iiit-P\lab_2\3a> []
```

Pic_2

answer.txt

You, 51 seconds ago | 1 author (You)

```
1   Rank of students according to question :-
2
3   RANK 1 : sourish
4   RANK 2 : srijan
5   RANK 3 : soham
6   RANK 4 : som
7   RANK 5 : srushti
8
```

Exercise 3.b

Sudo Code:

create 2 input txt file

Add data in asc order

initialize input output file stream

to read and write data

create class node

*which contain int data and node *next*

take input of these two .txt file

in two different arrays

*create four node pointers *first , *second , *third and *endptr*

create a void function create so that it can create two linked lists using two array

*make a node*first point on first element and in each iteration link previous node and make next point to null ptr*

create a mergeLink function to merge these two linked list

create a separate linked list head pointing to first element of list

on each iteration compare both the link element

if(link1->data >= link2->data) store element to new linked list and move pointer to next element of link2 or and do not change link1 vice versa

also add a display function to display merge sort linked list
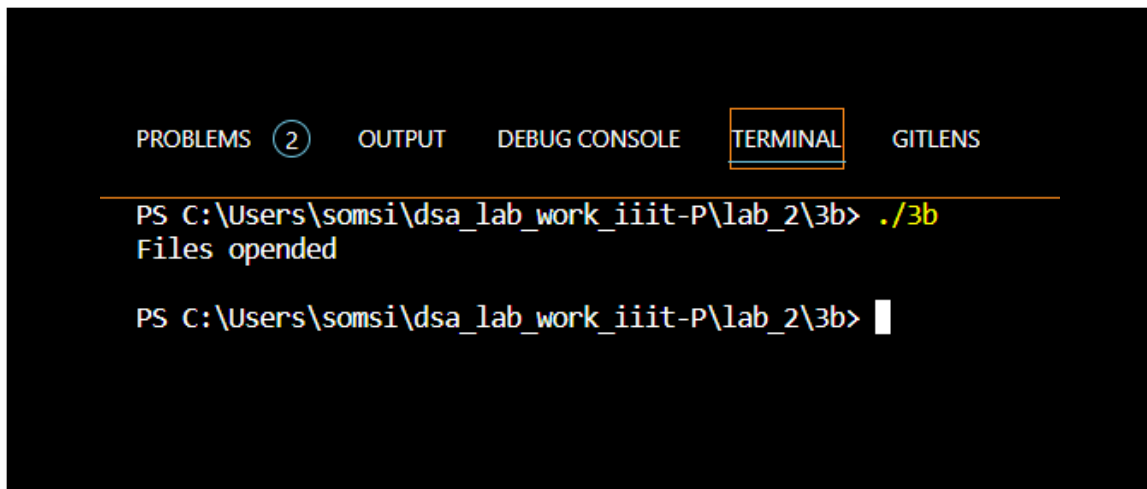
Time complexity:

O(n)

Input:

	list1.txt		list2.txt
	You, 5 hours ago | 1 autho		You, 6 hours ago | 1 author (You)
1	7	1	12
2	5	2	5
3	50	3	15
4	75	4	25
5	100	5	28
6	110	6	65
7	120	7	67
8	140	8	87
9	150	9	108
10		10	111
		11	122
		12	133
		13	144

Output:

Pic_1

Pic_2

```
 answer.txt  ✕

  answer.txt
         You, 5 hours ago | 1 author (You)
   1     My merged list is here :-
   2     5
   3     5
   4     15
   5     25
   6     28
   7     50
   8     65
   9     67
  10     75
  11     87
  12     100
  13     108
  14     110
  15     111
  16     120
  17     122
  18     133
  19     140
  20     144
  21
```

Exercise 3.c

Sudo Code:

create a input .txt file

initialize input output file stream

to read and write data

create class node

with data and node *next in it declared a public member

take input in an array of interges

create a function name push

make a static int variable ctr ;

for ctr = 0 ; first, last will point to first element

for ctr!=0 ; every new element will be pushed and previous node will point to new one

to pop an element use ptr->next-next

if(ptr->next->next) point to first element then it will simply make then nullptr else a new ptr will point to

ptr->next->next and last point to ptr

and deleted element will be ptr->next->data

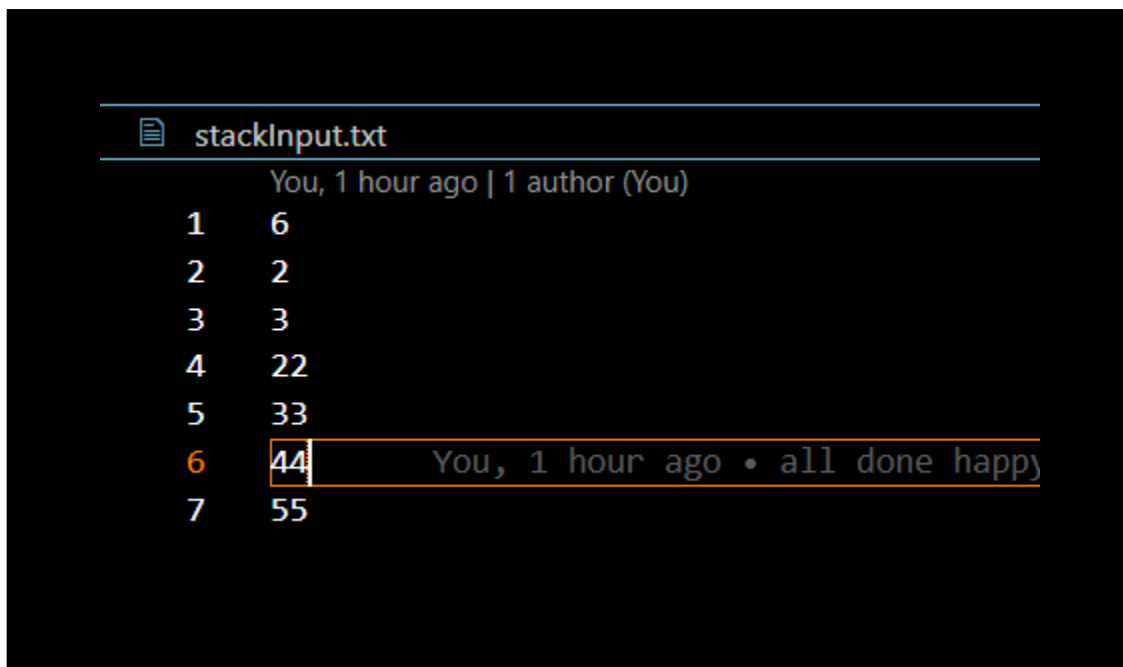create a display function to show full linked list

ptr=first;

while ptr!=null

ptr->data

ptr=ptr->next

Time complexity:

O(n)

Input:

Output:

Pic_1

```
69
70                  You, 1 second ago • Uncommitted changes
71        display()  ;
72
73          pop();pop();pop(); pop();pop();pop();
74
75        display();
76
77      push(1000);push(101);
78
79        display();
80
81        pop() ;
82
83    display();
84    return 0;
85
86  }
```

Pic_2

📄 answer.txt

You, 1 hour ago | 1 author (You)

```
 1   2 3 22 33 44 55
 2
 3   55 element of linked list is deleted
 4   44 element of linked list is deleted
 5   33 element of linked list is deleted
 6   22 element of linked list is deleted
 7   3 element of linked list is deleted
 8   2 element of linked list is deleted
 9   List is empty :(
10
11
12   1000 101
13
14   101 element of linked list is deleted
15   1000          You, 1 hour ago • done with a new test case …
16
17
```